SIEMENS

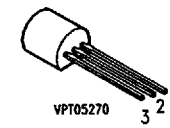
SIEMENS AKTIENGESELLSCHAF

T-29-21

## PNP Silicon AF Transistors

**BC 257**
**... BC 259**

- High current gain
- Low collector-emitter saturation voltage
- Complementary types: BC 167, BC 168, BC 169 (NPN)




| Type | Marking | Ordering Code | Pin Configuration 1 | 2 | 3 | Package[1] |
|---|---|---|---|---|---|---|
| BC 257 | – | Q62702-C700 | E | C | B | TO-92 |
| BC 257 A | | Q62702-C184 | | | | |
| BC 257 B | | Q62702-C206 | | | | |
| BC 258 | | Q62702-C701 | | | | |
| BC 258 A | | Q62702-C187 | | | | |
| BC 258 B | | Q62702-C188 | | | | |
| BC 258 C | | Q62702-C438 | | | | |
| BC 259 | | Q62702-C702 | | | | |
| BC 259 B | | Q62702-C192 | | | | |
| BC 259 C | | Q62702-C439 | | | | |

[1] For detailed information see chapter Package Outlines.

**Maximum Ratings**

| Parameter | Symbol | Values BC 257 | BC 258 | BC 259 | Unit |
|---|---|---|---|---|---|
| Collector-emitter voltage | $V_{CE0}$ | 45 | 25 | 20 | V |
| Collector-base voltage | $V_{CB0}$ | 50 | 30 | 25 | |
| Emitter-base voltage | $V_{EB0}$ | 5 | | | |
| Collector current | $I_C$ | 100 | | | mA |
| Peak collector current | $I_{CM}$ | 200 | | | |
| Peak base current | $I_{BM}$ | 200 | | | |
| Peak emitter current | $I_{EM}$ | 200 | | | |
| Total power dissipation, $T_C$ = 70 °C | $P_{tot}$ | 500 | | | mW |
| Junction temperature | $T_j$ | 150 | | | °C |
| Storage temperature range | $T_{stg}$ | – 65 ... + 150 | | | |

**Thermal Resistance**

| | | | |
|---|---|---|---|
| Junction - ambient | $R_{th\,JA}$ | ≤ 250 | K/W |
| Junction - case [1] | $R_{th\,JC}$ | ≤ 160 | |

[1] Mounted on Al-heat sink 15 mm × 25 mm × 0.5 mm.

**Electrical Characteristics**
at $T_A$ = 25 °C, unless otherwise specified.

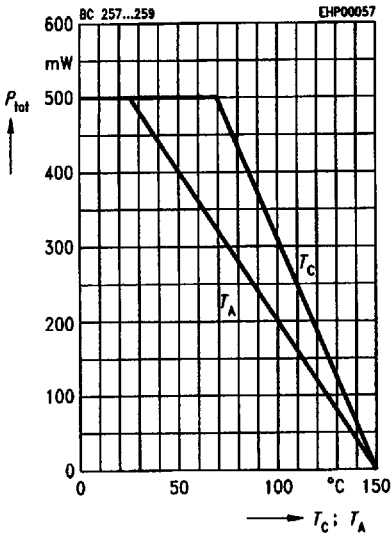
| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | min. | typ. | max. | |
| **DC characteristics** | | | | | |
| Collector-emitter breakdown voltage | $V_{(BR)CEO}$ | | | | V |
| $I_C$ = 2 mA | | | | | |
| BC 257 | | 45 | – | – | |
| BC 258 | | 25 | – | – | |
| BC 259 | | 20 | – | – | |
| Collector-base breakdown voltage | $V_{(BR)CBO}$ | | | | |
| $I_C$ = 10 µA | | | | | |
| BC 257 | | 50 | – | – | |
| BC 258 | | 30 | – | – | |
| BC 259 | | 25 | – | – | |
| Emitter-base breakdown voltage | $V_{(BR)EBO}$ | 5 | – | – | |
| $I_E$ = 1 µA | | | | | |
| Collector cutoff current | $I_{CBO}$ | | | | |
| $V_{CB}$ = 30 V | | – | – | 15 | nA |
| $V_{CB}$ = 30 V, $T_A$ = 150 °C | | – | – | 4 | µA |
| DC current gain | $h_{FE}$ | | | | – |
| $I_C$ = 10 µA; $V_{CE}$ = 5 V | | | | | |
| BC 257 A, BC 258 A | | – | 90 | – | |
| BC 257 B, BC 258 B, BC 259 B | | – | 150 | – | |
| BC 258 C, BC 259 C | | – | 270 | – | |
| $I_C$ = 2 mA; $V_{CE}$ = 5 V | | | | | |
| BC 257 A, BC 258 A | | 125 | 180 | 250 | |
| BC 257 B, BC 258 B, BC 259 B | | 220 | 290 | 475 | |
| BC 258 C, BC 259 C | | 420 | 520 | 800 | |
| Collector-emitter saturation voltage [1] | $V_{CEsat}$ | | | | mV |
| $I_C$ = 10 mA; $I_B$ = 0.5 mA | | – | 75 | 300 | |
| $I_C$ = 100 mA; $I_B$ = 5 mA | | – | 250 | 650 | |
| Base-emitter saturation voltage [1] | $V_{BEsat}$ | | | | |
| $I_C$ = 10 mA; $I_B$ = 0.5 mA | | – | 700 | – | |
| $I_C$ = 100 mA; $I_B$ = 5 mA | | – | 930 | – | |
| Base-emitter voltage | $V_{BE\ (on)}$ | | | | |
| $I_C$ = 2 mA; $V_{CE}$ = 5 V | | 600 | 650 | 750 | |
| $I_C$ = 10 mA; $V_{CE}$ = 5 V | | – | – | 820 | |

[1] Pulse test: $t \leq 300$ µs, $D \leq 2$ %.

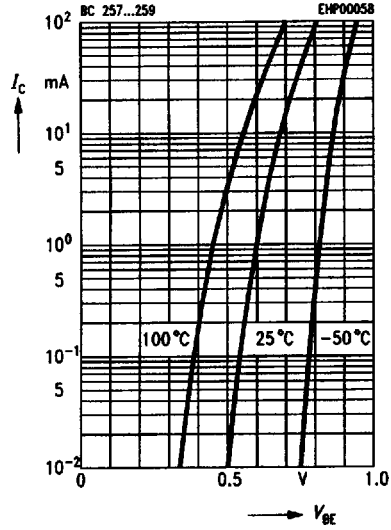
**Electrical Characteristics**
at $T_A$ = 25 °C, unless otherwise specified.

| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | min. | typ. | max. | |
| **AC characteristics** | | | | | |
| Transition frequency<br>$I_C$ = 20 mA, $V_{CE}$ = 5 V, $f$ = 100 MHz | $f_T$ | – | 250 | – | MHz |
| Output capacitance<br>$V_{CB}$ = 10 V, $f$ = 1 MHz | $C_{obo}$ | – | 4 | – | pF |
| Input capacitance<br>$V_{EB}$ = 0.5 V, $f$ = 1 MHz | $C_{ibo}$ | – | 10 | – | |
| Short-circuit input impedance<br>$I_C$ = 2 mA, $V_{CE}$ = 5 V, $f$ = 1 kHz | $h_{11e}$ | | | | kΩ |
| BC 257 A, BC 258 A | | – | 2.7 | – | |
| BC 257 B, BC 258 B, BC 259 B | | – | 4.5 | – | |
| BC 258 C, BC 259 C | | – | 8.7 | – | |
| Open-circuit reverse voltage transfer ratio<br>$I_C$ = 2 mA, $V_{CE}$ = 5 V, $f$ = 1 kHz | $h_{12e}$ | | | | $10^{-4}$ |
| BC 257 A, BC 258 A | | – | 1.5 | – | |
| BC 257 B, BC 258 B, BC 259 B | | – | 2 | – | |
| BC 258 C, BC 259 C | | – | 3 | – | |
| Short-circuit forward current transfer ratio<br>$I_C$ = 2 mA, $V_{CE}$ = 5 V, $f$ = 1 kHz | $h_{21e}$ | | | | – |
| BC 257 A, BC 258 A | | – | 200 | – | |
| BC 257 B, BC 258 B, BC 259 B | | – | 330 | – | |
| BC 258 C, BC 259 C | | – | 600 | – | |
| Open-circuit output admittance<br>$I_C$ = 2 mA, $V_{CE}$ = 5 V, $f$ = 1 kHz | $h_{22e}$ | | | | µS |
| BC 257 A, BC 258 A | | – | 18 | – | |
| BC 257 B, BC 258 B, BC 259 B | | – | 30 | – | |
| BC 258 C, BC 259 C | | – | 60 | – | |
| Noise figure<br>$I_C$ = 0.2 mA, $V_{CE}$ = 5 V, $R_S$ = 2 kΩ<br>$f$ = 1 kHz, $\Delta f$ = 200 Hz | $F$ | | | | dB |
| BC 257, BC 258 | | – | 2 | – | |
| BC 259 | | – | 1 | 4 | |

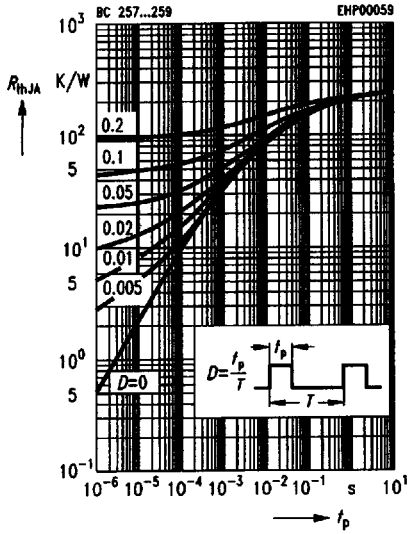
**Total power dissipation** $P_{tot} = f(T_A; T_C)$



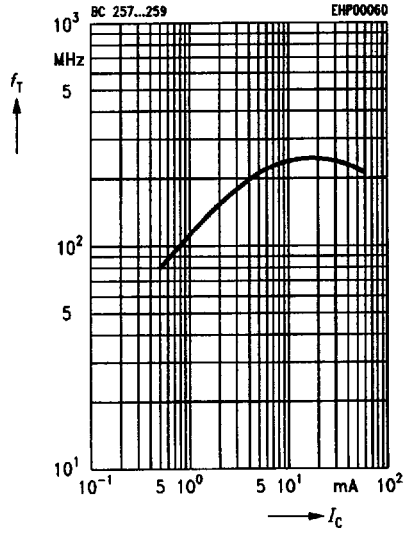

**Collector current** $I_C = f(V_{BE})$
$V_{CE}$ = 5 V



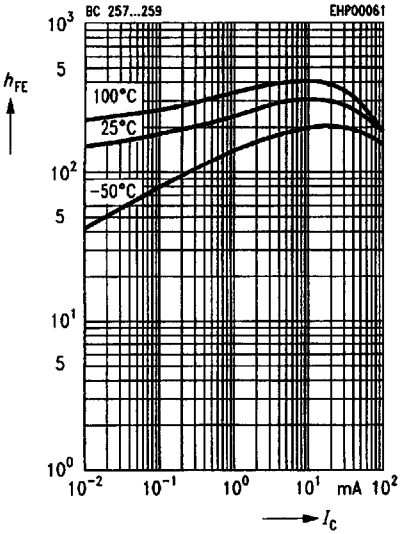

**Permissible pulse load** $R_{thJA} = f(t_p)$



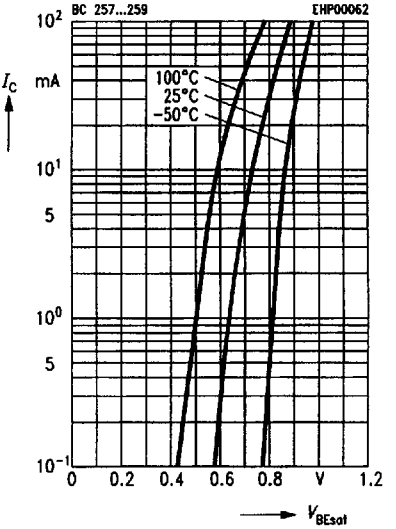

**Transition frequency** $f_T = f(I_C)$
$V_{CE}$ = 5 V, $f$ = 100 MHz



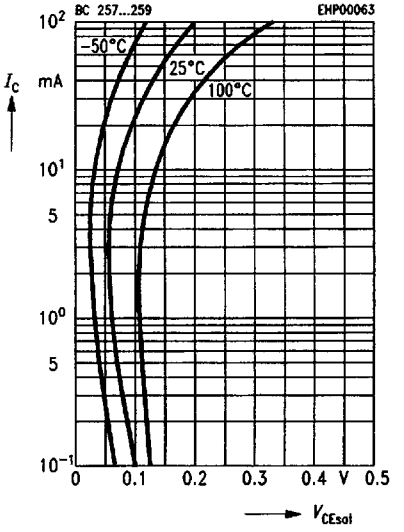
**DC current gain** $h_{FE} = f(I_C)$
$V_{CE}$ = 5 V (common emitter configuration)



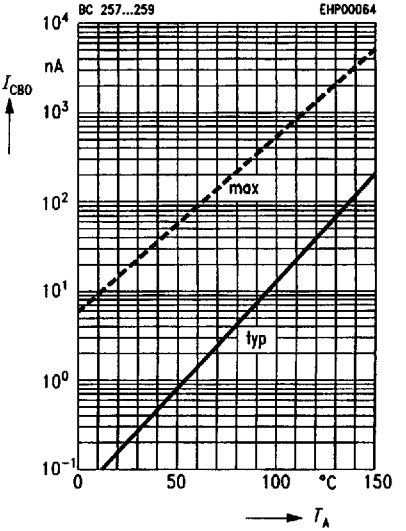

**Base-emitter saturation voltage**
$V_{BEsat} = f(I_C)$
$h_{FE}$ = 20



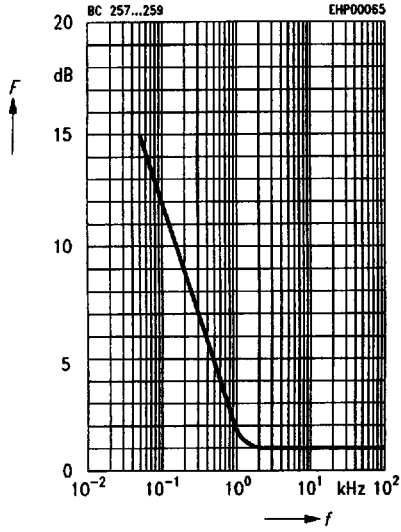

**Collector-emitter saturation voltage**
$V_{CEsat} = f(I_C)$
$h_{FE}$ = 20



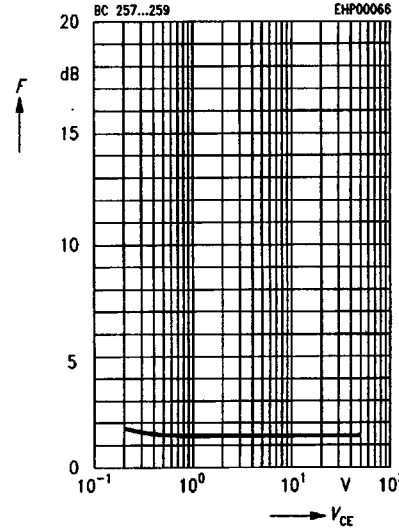

**Collector cutoff current** $I_{CB0} = f(T_A)$
$V_{CB}$ = 30 V



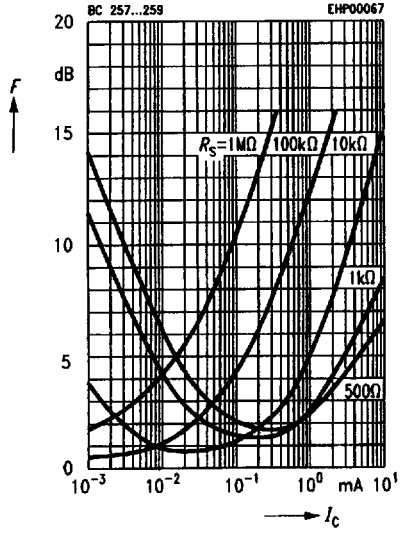
**Noise figure** $F = f(f)$
$I_C$ = 0.2 mA, $f$ = 12 kHz, $R_S$ = 2 kΩ



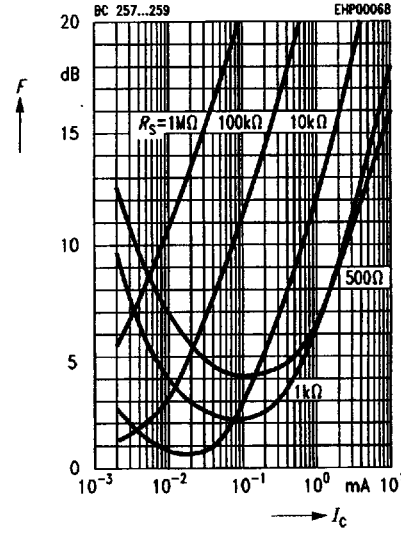

**Noise figure** $F = f(V_{CE})$
$I_C$ = 0.2 mA, $R_S$ = 2 kΩ, $f$ = 1 kHz
$\Delta f$ = 200 Hz, $T_A$ = 25 °C



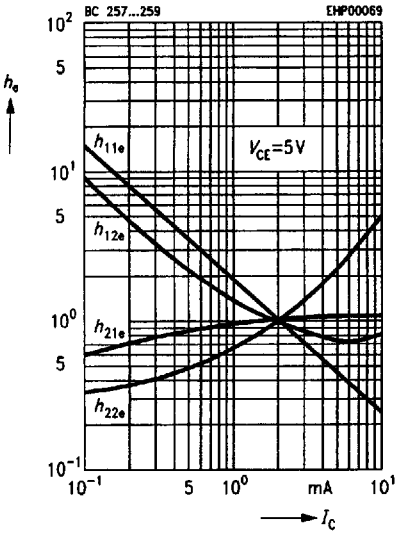

**Noise figure** $F = f(I_C)$
$V_{CE}$ = 5 V, $f$ = 120 kHz




**Noise figure** $F = f(I_C)$
$V_{CE}$ = 5 V, $f$ = 1 Hz



**h parameter** $h_e = f(I_C)$




**Capacitance** $C = f(V_{CB}, V_{EB})$